HOME OFFICE.

OUTBREAK OF ENTERIC FEVER AT BRENTRY CERTIFIED INEBRIATE REFORMATORY.

REPORT

TO THE

RIGHT HONOURABLE THE SECRETARY OF STATE FOR THE HOME DEPARTMENT,

BY

R. W. BRANTHWAITE, ESQ., M.D., D.P.H.,

H.M. INSPECTOR UNDER THE INEBRIATES ACT.

Presented to both Houses of Parliament by Command of His Majesty.

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SOME DETAILS CONCERNING AN OUTBREAK OF

ENTERIC FEVER

AT BRENTRY CERTIFIED INEBRIATE REFORMATORY.

PRESENTED AS A REPORT TO THE RIGHT HONOURABLE THE SECRETARY OF STATE FOR THE HOME DEPARTMENT,

BY

THE INSPECTOR UNDER THE INEBRIATES ACTS.

Brentry Reformatory.

Brentry is an institution for the reception and treatment of habitual inebriates committed to reformatory detention under the Inebriates Act of 1898. It was established in 1899, ou the colony principle, and consists of 16 separate buildings scattered over an estate of about 98 acres. Situated nearly six miles from Bristol, and a little over one mile from the village of Westbury-on-Trym, it is disconnected by open country from any congested district, and occupies a site which practically dominates the surrounding neighbourhood.

The water supply to the Reformatory is derived partly from the Bristol main system, and partly from a 350-ft. well, bored through mountain limestone. The institution sewage is dealt with on the premises, by septic tanks, breeze filter beds, and surface irrigation. The Reformatory normally contains, roughly, 265 persons, about 30 being officers and 235 inmates. All food supplies, except milk, butter, and vegetables, are obtained on contract from ordinary sources. Cows are kept on the premises for milk supply, from which only a small amount of butter is occasionally made, the larger quantity of the latter commodity being obtained by purchase. All vegetables used in the institution are grown in gardens attached to the Reformatory, none of which are connected with the area irrigated by sewage.

Concerning the Outbreak generally.

From 1899 until the latter part of 1906 the institution remained quite free from all forms of infectious disease. The first case of enteric fever which occurred was reported in September, 1906, between which date and November, 1907, no less than 28 persons were attacked, two of whom died. Six persons, in addition to those who died, suffered from the disease in severe form ; all other cases were of milder type. All were confirmed by Widal's blood test, and some by bacteriological analysis ; all were distinctly typhoid, none para-typhoid. The cases occurred at irregular intervals and always in batches, three, four, or five sickening at (or abont) the same time, evidently from more or less simultaneous infection. This intermittent feature of the epidemic has been a definite characteristic throughout. Out of the total of 28 cases, 11 were officers of different grades, or officers' wives, one was a visitor to the Reformatory, and the rest were inmates.

The First Case.

A woman inmate, who had been some months under detention, and therefore totally removed from all outside source of direct infection, was the first person attacked. The sickening of this woman gave rise to a minute investigation into all possible means whereby infected material could have been

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introduced into the Reformatory, and a detailed inspection of food was undertaken. Enquiries were made at the various sources of food supply in the hope of finding an enteric connection, and a close examination into the methods of food distribution on the premises was carried out, to eliminate the possibility of local contamination. A clinical examination of all recently admitted inmates was made, on the assumption that some mildly affected typhoid person had been inadvertently admitted; but all such inmates appeared in good health, and none (so far as information could be obtained) had come from infected districts.

The cows kept on the premises were examined for disease, and passed as sound by a capable veterinary surgeon, the cow-yard was repaved, the byres cleansed and whitewashed, and some drainage arrangements in connection with cow-sheds were improved to remove possible danger. A new milk sterilizer was fitted and brought into use, the making of butter was discontinued, and special supervision was instituted over the making of bread. The water supply was carefully examined with a view to the discovery of possible pollution at source, or during distribution; the analysts, however, gave an excellent report concerning the condition of the water, and there appeared to be no chance of infection during distribution. The drainage system was overhauled, and found to be defective in some parts; but, whatever defects were found, it was quite clear that no pollution of water or food resulted therefrom. Enquiries were made into the health of the surrounding country; but the neighbourhood of the Reformatory proved to be quite free from enteric.

I mention these details to show that all the ordinary means by which enteric might have originated were enquired into, with the result that, although some defective arrangements were found, nothing was brought to light which explained the introduction of the disease to Brentry. Great care, of course, was taken to isolate the original case. The woman was placed in the infirmary under strict fever hospital conditions, and every possible precaution was taken to prevent infection being conveyed from her to others.

Progress of the Epidemic.

Notwithstanding the care exercised over food distribution, and sanitary conditions generally, another case or two occurred after a brief interval. Feeling that matters were becoming serious I asked for assistance from Dr. D. S. Davies, Medical Officer of Health for Bristol, and Dr. F. T. Bond, Medical Officer of Health for South Gloucestershire, who met me at Brentry in company with Dr. H. L. Ormerod, the Consulting Physician to the Institution, and Dr. D. Fleck, the Resident Medical Superintendent. At that meeting it was generally agreed that all necessary precautions had been taken, and that a termination of the outbreak would probably result.

But, contrary to expectation, cases continued to occur without any definite indication as to cause, except that each fresh case, and all taken together, pointed to milk contamination, rather than to general infection of food. Three officers were attacked who boarded themselves (away from the Reformatory) and had no food from the institution except milk. Three inmates sickened who, as mothers with infants, received an extra allowance of milk not given to other inmates. Officers were attacked in larger proportion than inmates, the former being supplied with milk in an unmixed state, whilst the latter were never given milk until after admixture with boiling tea or cocoa. All inmates who were attacked (other than mothers with infants) were working in kitchen or mess-rooms where they had to make tea, or were otherwise engaged in occupations affording access to milk in its unmixed state. In fact, no inmates, except mothers, or persons employed in kitchen or mess-rooms, have been attacked throughout the epidemic. Finally a tea party confirmed the suspicion against milk. An officer from a neighbouring institution visited the Matron of Brentry and remained to tea. This visitor had not previously called at Brentry, has not visited since, never obtained food from Brentry at any other time, and (so far as could be ascertained) had not been exposed to infection elsewhere. During her visit to Brentry this lady had no food except at tea. A second Brentry officer (the Chief Clerk) was also invited to the meal in question, making three persons altogether—the visitor, the matron, the clerk.

All three had the following articles of food:—"Tea with milk added, bread (made at Brentry), jam (made at the matron's home), and two of them had what they called "clotted cream." After the sterilization of milk a thick creamy scum rises to the surface on cooling, which, if skimmed off, makes a good substitute for the ordinary article sold as "clotted cream." Two of the three persons (the matron and the visitor) ate the clotted cream, the clerk refused. About three weeks afterwards, on the same day, the matron and the visitor sickened with enteric and suffered severe attacks; the clerk remained well.

Special Efforts to ensure Purity of Milk.

The above indications pointed clearly to milk contamination, resulting (1) from infection previous to sterilization, the latter process being imperfectly carried out, or (2) from infection subsequent to sterilization. Thus focussed upon milk that article of diet received renewed attention from source to final distribution. For chances of infection previous to sterilization, the cows were again overhauled, but showed no sign of disease, or any reason to justify a second veterinary examination. The cowman and his assistants were examined for mild enteric, the blood of the former being three times subjected to Widal's test, with negative result. These persons were also watched for uncleanliness. The cans, used for transfer between shed and sterilizer. were protected from accidental contamination, cleansed with water of undoubted purity, and were not allowed to be touched by persons other than those proved by clinical examination to be in good health, and apparently free from all suspicion of enteric. Some doubt being suggested as to the efficiency of sterilization the recently installed machine was abandoned, and a better one substituted, which afterwards proved to be all that could be desired. Careful arrangements were made to restrict the handling of milk after sterilization, and its subsequent manipulation was confined to two persons—the dairy officer and a Mrs. X., an inmate, who, by careful education, had become an efficient dairymaid. Both these persons were robust, and apparently in excellent health.

In one way and another, therefore, a protective cordon was drawn round the milk, from source to distribution. But, notwithstanding this, cases still occurred, each continuing to point to milk infection. Moreover, in view of the now perfect action of the sterilizer, it became evident that contamination must occur *subsequent* to sterilization, probably during its period of standing in the dairy between sterilization and distribution. Renewed enquiry as to the condition of the dairy, and contiguous buildings, elicited the information that rats occasionally found their way into the former, and had been known to leave tracks from milk cans. A rat hole was found in the dairy and the surrounding buildings were discovered to be more or less infested with these animals. Wooden floors in pantry, stores, and even in places where food is only temporarily kept, were taken up and replaced with cement, and all rat holes (or openings capable of admitting rat or mouse) were effectually closed, with the result that any possible contamination from that source was eliminated. In making these changes, and in strictly limiting the handling of milk to the dairy officer and Mrs. X., the further infection of milk, subsequent to sterilization, seemed to be impossible. The continuance of the epidemic, however, after all these precautions had been taken, puzzled me so completely that I repeated my request for assistance from Dr. Davies and Dr. Bond, who again met me at Brentry, and were put in possession of the history of developments subsequent to their previous visit.

The Possibility of a Human "Carrier."

Dr. Davies, with the work of some German investigators in mind, visited Brentry again a few days later, in the hope of being able to fix upon an apparently healthy human "carrier" as the cause of the outbreak. Canon Parker (Chairman of the House Committee), who met him on that occasion, also seemed to have a similar object in view, for he asked whether there was likely to be any truth in the report that "a cook in New York had been known to carry typhoid about," although herself not suffering from the disease. That

interview between Dr. Davies and Canon Parker resulted in the removal from the dairy of Mrs. X. (the dairymaid), on suspicion of being an infected individual.

Some Information about Human "Carriers."

At the end of this report will be found references to published articles concerning this curious condition. Without entering into details, which can be obtained by reference to the articles referred to, the main points are as follows:—

Klinger (1906) showed conclusively that persons of either sex, or any age, without symptoms of ill-health, might be "bacilli carriers," and remain infective in consequence for an indefinite number of years. Such "carriers," he maintained, might never have had enteric fever themselves (acute carriers), or might have gone through a regular attack and remained infective after an apparently complete recovery (chronic carriers). He examined 1,700 presumably healthy persons and found 23 "carriers," 11 acute and 12 chronic; *i.e.*, he actually found typhoid bacilli in the excreta of these persons. He proved conclusively that such infected excreta were very virulent to guinea-pigs, and he suggested that they might reasonably be expected to infect human beings.

Kayser (1906) published the case of a woman, proprietor of a bakehouse in which succeeding journeymen kept developing typhoid. The woman had suffered from enteric fever 10 years before, and, although apparently in good health, her excreta were found to be full of bacilli.

Friedel (1907) traced a typhoid outbreak, in an asylum, to a kitchen worker who was infective, although, so far as evidence was obtainable, she had never had a regular attack of enteric.

Soper (*New York*, 1907) in making an inquiry as to the cause of several simultaneous cases of typhoid fever occurring in a family in New York City, elicited the information that the cook employed had lived in four different families during the period between 1902 and 1907. In each instance it was discovered that from three to four weeks after the cook had entered upon her duties practically all the members of each household were stricken with typhoid fever. The woman's bowel discharges were found to furnish practically pure cultures of the typhoid bacillus.

In order to obtain some confirmation of the last-named instance, Dr. Davies communicated with Dr. Darlington (Commissioner of Health, New York), who writes—"The woman has since been kept in one of the hospitals of this Department under constant supervision. At intervals of a day or two the fæces are clear, but this intermission is invariably followed by a discharge containing the bacilli in practically unlimited quantity. The woman is of medium height, robust appearance, and feels, and appears, healthy in every way." (The woman is said to have admitted that she had typhoid in or about 1901.)

The Human "Carrier" at Brentry.

These investigations by others led to the consideration of their application to the Brentry epidemic, and induced Dr. Davies, as an initial measure, to remove Mrs. X. from her dairy work. Enquiry elicited the information that, amongst the inhabitants of Brentry, 11 male inmates, six male officers, and six female inmates had at some time in their lives suffered from an attack of typhoid.

Mrs. X. was found to be one of the six female inmates; she had passed through a regular attack of the disease six years previously, from which she had apparently completely recovered. The male officers, and male inmates (having no chance of contaminating milk), were eliminated, and attention was concentrated upon Mrs. X. and the five other women inmates. The latter were examined by blood test and bacteriologically, with no conclusive results. Widal's blood test in the case of Mrs. X. gave a semi-positive reaction, sufficiently conclusive to indicate the necessity for further examination. Her excreta were examined twice without any bacilli being found, but the third time

pure cultures were obtained, and the woman was thus proved to be in a highly infective state. Her freedom from bacilli on the two first examinations also showed that the infective condition was intermittent, not regular. Allowing for the ordinary period of incubation, no cases of enteric have occurred at Brentry since the removal of Mrs. X. from the dairy nearly three months ago, and there seems to be every reason to believe that she has been the sole cause of the outbreak. The epidemic started after her admission to kitchen work, where she was able to contaminate food and milk in a modified degree, and became more virulent after she was given dairy work only.

The whole story is really too connected to admit of doubt:—

(1) The certainty of food contamination.
(2) Limitation to milk infection.
(3) Limitation to milk contamination after sterilization.
(4) The only chances of contamination after sterilization being rats, the dairy officer, or Mrs. X.
(5) Elimination of rats, and proved health of dairy officer.
(6) The finding of typhoid bacilli in Mrs. X.'s excreta, and the favourable opportunity she possessed of contaminating milk or "clotted cream" after sterilization.
(7) The intermittent character of the Brentry epidemic, agreeing with the intermittent discharge of bacilli by Mrs. X.; and
(8) The sudden cessation of typhoid at Brentry after the woman's removal from dairy work.

Conclusion.

Of course it is still possible, during the progress of further investigation, that more "carriers" may come to light amongst other persons who have suffered from enteric fever previous to admission to Brentry, or who have been attacked during the progress of the recent outbreak. Failing this possibility (or even in spite of it, if all recovered typhoid persons are kept from dealing with the food) it is fairly certain that we may anticipate for this institution freedom from the disease in future.

The investigation has been one of great interest, and the result, I think, should prove of much wider significance than is represented by the elucidation of a single epidemic. Outbreaks in institutions, such as prisons, lunatic asylums, and workhouses, following exactly the intermittent dropping character of the Brentry outbreak, although fairly common, have too often remained unexplained. I think it will ultimately be found that the apparently robust human "carrier" will prove to be the cause of many such occurrences.

Whatever else may be deduced from our experience in this epidemic, it is fairly obvious that persons who have had typhoid, at any previous date, should be subjected to more than a cursory examination before being appointed to posts which necessitate the handling, or distribution, of food. It also seems evident, in view of the uncertainty which must prevail as to whether persons are infective or not, that greater care is indicated to ensure cleanliness, and even disinfection, of the hands and finger nails of all persons employed in the preparation or manipulation of food, especially when avoidance of these precautions is likely to harm large bodies of persons under detention in institutions, or collected as an army in the field. Resort to such special measures for cleanliness should invariably follow attention to the calls of nature by persons so employed. It is also of extreme importance to discover whether a typhoid "carrier" can, by any course of treatment, be rendered non-infective, or whether persons who have become "chronic carriers" will remain in that condition for the remainder of life. In either contingency, the notification and registration of such persons seems to be indicated, until freedom from infection can be guaranteed.

I am especially indebted to Dr. D. S. Davies for his lead in a direction which ultimately ended in success, and generally for his assistance as an able colleague in a difficult investigation. My thanks are also due to Professor Walker Hall, whose patient bacteriological work throughout the epidemic has materially conduced to the final result.

R. Welsh Branthwaite.

Bibliography.

1906. Kayser (1): Ueber die Gefährlichkeit der Typhusbazillenträger. *Arb. a. d. kais. Gesundh.*, Bd. 24, p. 176.
1906. Kayser (2): Milch u. Typhuebazillenträger. *Arb. a. d. kais. Gesundh.*, Bd. 24, p. 173.
1907. Kayser (3): Ueber Untersuchungen bei Personen die vor Jahren Typhus durchgemacht haben und die Gefährlichkeit von "Bazillenträgern." *Arb. a. d. kais. Gesundh.*, Bd. 25, p. 223.
1906. Klinger: Ueber Typhusbazillenträger. *Arb. a. d. kais. Gesundh.*, Bd. 24, p. 91.
1907. Nieter: Ueber das Vorkommen und die Bedeutung von Typhusbazillenträgern in Irrenanstalten. *Münch. med. Woch.*, p. 1622.
1906. Levy u. Kayser: Bakteriologischer Befund bei der Autopsie einee Typhusbazillenträgers. *Münch. med. Woch.*, p. 2434. Also, *Arb. a. d. kais. Gesundh.*, Bd. 25, p. 254. 1907.
1907. Friedel: Zur Casuietik der Typhusträger. *Zeitsch. für Med. Beamte*, No. 6.
1907. Soper: The Work of a Chronic Typhoid Germ Distributor. *Journ. Amer. Med. Assoc.*, vol. xlviii., p. 2019.
1907. Savage: "Recent work in the Bacteriology of Typhoid Fever." *Public Health*, Oct., 1907.
1908. Ledingham and Ledingham: "Typhoid Carriere." *Brit. Med. Journ.*, No. 2453, p. 15.